

# Chapter 1

## General Design Requirements

City of Kelso  
Engineering Design Manual  
March 2010

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## **CHAPTER 1 – GENERAL DESIGN REQUIREMENTS**

### **1.00 Requirements for Public Improvements**

#### **A. General**

The purpose of this document is to set standards for the design and construction of public improvements. These include street, bikeway, drainage, water, and sanitary sewer improvements as required by the development review process, City ordinance, and other City policies adopted by the City. Standards for site grading, erosion control, parking lot, private street, and driveway construction on private property are also contained in these standards. No such work shall commence prior to City approval of the construction plans. Design submitted shall be stamped by a registered professional engineer licensed to practice in the State of Washington, or as otherwise approved by the Director.

All public improvements and private streets, parking lots, sidewalks, and driveways shall be designed and constructed in such a manner as to be readily accessible to and usable by individuals with disabilities as per the requirements of the Americans with Disabilities Act. This includes providing curb ramps at intersections with pedestrian crosswalks to allow a smooth transition between street and sidewalk elevations.

#### **B. Shortened Designation**

This City of Kelso Engineering Design Manual shall be cited routinely in the text as the "KEDM."

#### **C. Applicability**

The KEDM shall govern all new construction and upgrading of facilities both in the right-of-way and on-site for: transportation-related facilities; storm drainage facilities and stream channel improvements; sewer and water improvements; and park, recreation, and open-space facilities used by the public.

### **1.01 Precedence of Documents**

If there is a conflict between approval documents, the document highest in precedence shall control. The precedence shall be:

First: Permits from other agencies as may be required by law.

Second: Modifications to the KEDM as approved by the Director.

Third: Conditions of approval, facilities review, and site development permit.

- Fourth: City of Kelso Ordinances.
- Fifth: Kelso/Longview Standard Plans and Specification.
- Sixth: Plans and details prepared by the design engineer.
- Seventh: WSDOT Standards Specifications for Road, Bridge, and Municipal Construction.
- Eighth: Reference specifications.

Supplemental written agreements and approved revisions to plans and specifications by the appropriate jurisdiction will take precedence over documents listed above. Detailed plans shall have precedence over general plans. In any event, the determination of the Director shall be final.

## 1.02 Abbreviations and Definitions

<i>AASHTO</i>	American Association of State Highway and Transportation Officials.
<i>AC</i>	Asphaltic Concrete (See HMA).
<i>ACI</i>	American Concrete Institute.
<i>ADA</i>	Americans with Disabilities Act of 1990.
<i>ADT</i>	Average Daily Traffic.
<i>All Weather Surface</i>	A gravel or paved surface
<i>ALTA</i>	American Land Title Association.
<i>Amenity</i>	Amenity is a holistic stormwater approach that incorporates sustainable maintenance and aesthetics into designs that retain or mimic natural processes, and where stormwater itself promotes understanding of stormwater and increases a site's attractiveness and value. Amenity is holistic stormwater design, along with stormwater quality and quantity design, where stormwater itself becomes a site feature that can engage, educate and entertain visitors as well as enhance a site's attractiveness and value.
<i>ANSI</i>	American National Standards Institute.
<i>Applicant</i>	Any person, firm or corporation applying for public services, or responsible party for a development application.

<i>Appurtenance</i>	Any fixed object located adjacent to the roadway and deemed to be a possible safety hazard.
<i>APWA</i>	American Public Works Association.
<i>ASTM</i>	American Society for Testing and Materials.
<i>AWWA</i>	American Water Works Association.
<i>Bicycle</i>	A vehicle having two tandem wheels, propelled solely by human power.
<i>Bicycle Facilities</i>	A general term denoting improvements and provisions which accommodate or encourage bicycling, including parking facilities, maps, signs, pathways, bike lanes, widened sidewalks, bikeways, and shared roadways designated for bicycle use.
<i>Bicycle Lane (Bike Lane)</i>	A portion of a roadway, which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.
<i>Bicycle Path (Off-Street Pathway)</i>	A paved pathway physically separated from motorized vehicular traffic by an open space or barrier within an independent right-of-way.
<i>Bicycle Route (Bike Route)</i>	A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number, or as designated on a bicycle map, brochure, or guidebook.
<i>Bikeway</i>	Any road, path or way which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
<i>BMP</i>	Best Management Practice
<i>BMP Manual</i>	Volume II of the Stormwater Management Manual for Western Washington.
<i>CARV</i>	Combination Air and Vacuum Release Valve.
<i>CBE</i>	Crushed base equivalent (CBE) is the number that directly relates the traffic coefficient to the required number of inches of rock for street structural sections.
<i>CBR</i>	California Bearing Ratio.
<i>CCCP</i>	City of Kelso Cross Connection Control Plan as described in KMC 13.04.060.
<i>CDID #1</i>	Consolidated Diking Improvement District #1

<i>CDID #3</i>	Consolidated Diking Improvement District #3
<i>City</i>	City of Kelso.
<i>City Engineer</i>	City Engineer for the City of Kelso or their Designee.
<i>Connection</i>	The connection of a private or public street, driveway, or alley at the right-of-way line to a public street.
<i>Contractor</i>	The agent of the applicant completing the construction activities associated with a given project.
<i>Developer</i>	The owner and/or their agents or contractors responsible for a given project.
<i>Development</i>	Any improvement, public or private, which requires a land use permit.
<i>Director</i>	Director of Public Works or their designee.
<i>DOE</i>	Washington State Department of Ecology.
<i>DOE Orange Book</i>	Most recent edition of 'Criteria for Sewage Works Design' by the DOE.
<i>DOH</i>	Washington State Department of Health.
<i>Drip line</i>	The circle that could be drawn on the soil around a tree or shrub directly under the tips of its outermost branches.
<i>Ecology</i>	Washington State Department of Ecology
<i>Engineer</i>	Engineer doing the project design.
<i>EPA</i>	U.S. Environmental Protection Agency.
<i>FEMA</i>	Federal Emergency Management Agency.
<i>fps</i>	Feet per second
<i>Gate</i>	Movable barrier designed and constructed to prohibit or limit motor vehicle access from a public street to private property.
<i>GPS</i>	Global Positioning System.
<i>HMA</i>	Hot Mix Asphalt.
<i>IBC</i>	International Building Code with Washington amendments.
<i>IFC</i>	International Fire Code with Washington amendments.
<i>IE</i>	Invert Elevation.

<i>IMC</i>	International Mechanical Code with Washington amendments.
<i>IPC</i>	International Plumbing Code with Washington amendments.
<i>Impervious Area</i>	Those hard surface areas located upon real property which either prevent or retard saturation of water into the land surface, as existed under natural conditions pre-existent to development, and cause water to run off the land surface in greater quantities or at an increased rate of flow from that present under natural conditions pre-existent to development. Common impervious area materials include, but are not limited to, asphalt, concrete and gravel.
<i>Intersection</i>	Refers to the area jointed by two (2) or more roads intersecting. For approaches of a continuous street at an acute curve or some other angle point with different street names.
<i>KSAC</i>	Kelso Stormwater Advisory Committee
<i>Level of Service (LOS)</i>	A quantitative measure of traffic congestion identified by a declining letter scale (A-F) as calculated by the methodology contained in the Highway Capacity Manual Special Report 209 or as calculated by another method approved by the department of public works. LOS "A" indicates free flow of traffic with no delays while LOS "F" indicates jammed conditions or extensive delay.
<i>LID Manual</i>	Low Impact Development Manual, Puget Sound Partnership
<i>MR</i>	Ecology's Minimum Requirements
<i>Multi-Use Trail</i>	A pathway designated for pedestrian or bicycle use.
<i>MUTCD</i>	Manual on Uniform Traffic Control Devices.
<i>NEC</i>	National Electric Code with Washington amendments.
<i>NPDES</i>	National Pollutant Discharge Elimination System
<i>OS and Y</i>	Outside Stem and Yoke.
<i>OSHA</i>	Occupational Safety and Health Administration.
<i>Parking Lot</i>	Any area intended to accommodate parked vehicles for free or for a fee and not accessory to single-family residences.
<i>Peak Hour Trips</i>	The existing or calculated total vehicular trips entering and leaving a development during the peak hour of trip generation for the development, sometimes referred to as Design Hour Volume (DHV).

<i>Phase II Permit</i>	The City of Kelso's Western Washington Phase II Municipal Stormwater Permit
<i>Private Roadway</i>	Any vehicular access way, designed or intended to serve three or more parcels or dwelling units or any commercial business which has not been dedicated and accepted as a public roadway.
<i>Procedures Manual</i>	City of Kelso Procedures Manual for Construction of Public Improvements, Procedure for Permit projects by Private Contract.
<i>Professional Engineer</i>	An engineer licensed in the State of Washington
<i>PRV</i>	Pressure Reducing Valve.
<i>PSM</i>	Storm Water Management Manual for the Puget Sound Basin.
<i>RCW</i>	Revised Code of Washington.
<i>ROW</i>	Right-of-Way.
<i>Securities</i>	Bonds, retainers, cash deposits, assigned savings, or another type of guarantee used to guarantee the performance of or correct deficient work.
<i>Sidewalk</i>	The portion of a street designed for preferential use by pedestrians.
<i>Signal Spacing</i>	The required distance between intersections with traffic signals.
<i>SMMWW</i>	2005 Stormwater Management Manual for Western Washington, Ecology
<i>Standard Drawings</i>	The latest edition of the City of Kelso/Longview Standard Plans and Specifications.
<i>Street</i>	A public or private way, which affords the principal means of access to abutting property.
<i>SWPPP</i>	Stormwater Pollution Prevention Plan
<i>TCDH</i>	Traffic Control Device Handbook.
<i>Traffic Coefficient</i>	A number used in determining the structural section of a street.
<i>Trail</i>	In the context of the General Plan - "Trail" is synonymous with Bicycle Path (off-street pathway).
<i>Trip Generation</i>	The most recent calculated trip rates (either calculated by average or formula), published by the Institute of Traffic Engineers or other transportation engineering analysis proposed by an Applicant and deemed appropriate by the Director.



<i>Traffic Engineer</i>	An individual licensed by the State of Washington to practice professional engineering who has been retained by the City or others to design roadway improvements, including utilities.
<i>UL</i>	Underwriter's Laboratory.
<i>Unimproved Surface</i>	Any surface that is not maintained or where natural vegetation is expected to grow taller than 6".
<i>Unsignalized Access Spacing</i>	The distance between intersections that do not have a traffic signal.
<i>Unsignalized Spacing</i>	The distance between intersections that do not have a traffic signal.
<i>WAC</i>	Washington Administrative Code.
<i>WSDOT</i>	Washington State Department of Transportation
<i>WWM</i>	Stormwater Management Manual for Western Washington.
<i>Wetlands</i>	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Identification and delineation of jurisdictional wetlands and wetland boundaries shall be done by a qualified biologist using applicable State and Federal guidelines.
<i>WSDOT</i>	The Washington State Department of Transportation.
<i>WSDOT Standard Specifications</i>	The latest edition of the "Standard Specifications for Road, Bridge, and Municipal Construction" as published by the Washington State Department of Transportation and the American Public Works Association.
<i>WSM</i>	Water System Plan for the Longview-Kelso Urban Area

### 1.03 Permits

Permits, approvals, or agreements are required by the City and some-times other jurisdictions, prior to initiating any construction or demolition work elements described within these Standards.

The majority of work covered under these Standards will require multiple permit authority review and approvals. Several types of permits and approvals require prior approval from the authority before a building or other substantial permit can be issued. Any questions regarding information about permits, approvals, and agreements should be directed to the Director.

Grading permits, separate from construction plan approval, for developments are discouraged but may be issued at the discretion of the Director between May 1<sup>st</sup> and October 1<sup>st</sup>, provided that the Director may extend or shorten this time period on a case by case basis depending on actual weather conditions. The first review of the development's construction plans shall be completed prior to submittal of the grading permit application to the City.

#### **1.04 Submittal Requirements**

##### **A. General**

1. Submittal requirements consist of design plans, grading plans (where required), erosion control plans (where required), drainage calculations, geotechnical reports, and other information as required. Letters of transmittal referencing the project name shall accompany all submittals.
2. The WSDOT Standard Specifications are hereby adopted and incorporated as part of this document by reference except as modified herein.

##### **B. Design Plan Format**

1. The plans shall be submitted on 22" x 34" sheets, landscape format.
2. Vicinity maps shall be located on the first sheet of all plans and shall show the location of the project in respect to the nearest major street intersection.
3. A north arrow and scale bar shall be shown on each plan view sheet of the plans and adjacent to any other drawing, which is not, oriented the same as other drawings on the sheet.
4. Civil Site Development Plans shall be organized as follows:
  - a. Title sheet to include:
    - (i) Project name
    - (ii) Vicinity map
    - (iii) Name and mailing address of Applicant/Owner, engineering firm, survey firm, and geotechnical engineer
    - (iv) City Standard Construction Notes
    - (v) Index of sheets
    - (vi) Notice to excavators
    - (vii) Legend that provides the name and symbol for all symbols used on the subsequent pages
    - (viii) Four in by four inch space in the lower right corner for the City of Kelso's approval stamp.

- b. Composite utility plan: include existing public and private utilities, and proposed public improvements.
  - c. Sanitary sewer and water, including fire hydrant locations.
  - d. Street and storm sewer, showing existing and proposed contours at 2-foot intervals.
  - e. Grading and erosion control plan with maximum contour intervals of 5' for slopes over 10%, 2 feet for slopes 3% to 10% and ½ feet for slopes less than 3%. Contours shall extend offsite a minimum of 50 feet. This sheet shall also note the source of information, date of field work, and location of original document.
  - f. Approved preliminary plat (if it's a subdivision).
  - g. Landscape plan including sidewalks, bikeways, retaining walls, landscaping, irrigation, and lighting.
  - h. Signing and striping plan.
5. Details – All City Standard Drawings and details shall be full size.
6. The scale shall be 1-inch = 5 feet vertically, and 1-inch = 20 feet horizontally for all drawings. A scale of 1-inch = 10 feet may be used for more detailed drawings such as intersection drawings. The composite utility plan may be at a smaller scale if needed. Scale shall be shown with north arrow and within a title block. All scales shall be as designated above unless otherwise approved by the Director.
7. Letter size shall not be smaller than 0.10 of an inch high.
8. The location and elevation of a National Geodetic Survey, United States Geological Survey, Cowlitz County, or City of Kelso bench mark shall be shown. No other datum shall be used without permission of the City. Temporary control bench marks and elevations shall also be shown on the plans.
9. A title block shall appear on each sheet of the plan set and shall be placed in the lower right-hand corner of the sheet across the right-hand edge of the sheet. The title block shall include the name of the project, the engineering firm, the Owner, the sheet title, and the sheet number.
10. The seal of the registered Washington Professional Engineer responsible for preparation of the plans shall appear on each sheet.
11. The description and date of all revisions to the plans shall be shown on each sheet affected, and shall be approved and dated by the registered Professional Engineer of record as evidenced by an original signature or initial.

12. Through use of standard drafting symbols, indicate the location and direction of view for all sections.
13. The following statement shall appear on the cover sheet of all plans at a location immediately above or below the development engineer's professional stamp:  
"I hereby certify that these plans, and related design, were prepared in conformance with the City of Kelso's Engineering Design Manual. I acknowledge that City approval of these documents does not transfer liability."

C. Plan View

Plan views shall show the following:

1. Right-of-way, property, tract, and easement lines (existing and proposed).
2. Subdivision name, lot numbers, street names, and other identifying labels. Subdivision and street names are subject to the approval of the City Planning Director, Fire Chief, and Director.
3. Location and stationing of existing and proposed street center lines and curb faces.
4. Horizontal alignment and curve data of street center lines and curb returns including bearings along centerline.
5. Existing underground utilities and trees over 6-inches in diameter within the construction limit.
6. Location of existing buildings, wells, septic tanks, drain fields, fuel tanks, and any other buried structures.
7. Location, stationing, and size of all mains and service lines for storm drainage, sanitary sewer, and water; and location of all fire hydrants. Stationing shall be located in relationship to the street stationing at all manholes or other key locations.
8. Match lines with sheet number references.
9. Provisions for cross-connection control must be clearly shown on the plans, including any retro-fitting of existing water service connections and existing auxiliary water supplies, conversions to City of Kelso water service that are required as a condition of development approval, upgrading of existing service connections by replacement of same, and any other cross connection control required by state and local rules and codes.

10. Street stationing to be noted at a minimum of 100-foot stations.
11. Top of curb elevations along curb returns at quarter-delta's and 100-foot stations.
12. Location of the low points of street grades and curb returns.
13. Sidewalk locations. This shall include ramps, transitions in location or width, and relationship with driveways. It shall be shown with hatching what sidewalk is proposed to be constructed with the street and what sidewalk is proposed to be constructed with the buildings.
14. Crown lines along portions of streets transitioned from one typical section to another.
15. Centerline stationing of all intersecting streets.
16. Location and description of existing survey monuments, including but not limited to: section corners, quarter corners, donation land claim corners, and City bench marks.
17. Location of proposed street intersection monument boxes.
18. FEMA designated 100-year flood plains and flood ways, or areas of flooding during a 100-year storm event.
19. Wetland areas and storm water quality undisturbed corridors (buffer strips).
20. Legend.
21. Applicant's name, address, and phone number.
22. Any additional information that the City deems necessary.

D. Profile View

Profile Views shall show the following:

1. Stationing, elevations, vertical curve data (including curve k factors), and slopes for center of streets or top of curbs. For off-set or super elevation cross-sections, both curbs shall be profiled. Where curbs are not to be constructed, center line of street and ditch inverts shall be shown.

2. Original ground along the center line, and if necessary at the edges of the right-of-way if grade differences are significant.
3. Center line, top of curb, and gutter flow lines of existing streets for a distance of at least 300 feet each way at intersections with proposed streets. For stub streets that may be extended in the future, the vertical alignment shall be designed for at least 300 feet beyond the scope of the proposed construction, unless otherwise approved by the Director. At the discretion of the Director, additional design information concerning the vertical and horizontal alignment of future street extensions may be required.
4. Vertical alignment of streets, including existing center line monumentation.
5. The top of curb for all cul-de-sacs, eyebrows, and curb returns.
6. All proposed drainage facilities; all invert and top elevations, slopes, materials, bedding, and backfill.
7. Existing drainage facilities, including off-site facilities, upstream and downstream that affect the design (e.g. downstream restrictions that back water onto project site). In addition, base flood elevations shall be shown on the profile.
8. Profiles for ditch and creek flowlines shall extend a minimum of 200 feet beyond the project, both upstream and downstream with typical cross sections at 50-foot intervals, unless otherwise approved by the Director.
9. Designate structures using alpha or numeric labels on profiles to correspond to plan view notation.
10. Profile for existing and proposed storm, sanitary, and water mains.
11. All existing and proposed sanitary, water, storm lines, and other utilities crossing the profile.

#### E. Site Grading Plan

The City of Kelso requires a site-grading plan as part of the application for any development that involves the excavation or fill of greater than 50 cubic yards of material. Grading contours (existing & proposed) shall be at no more than 2-foot intervals. Existing contours shall extend off-site a minimum of 50 feet. This sheet shall also note source of information, date of fieldwork, and location of original document.

All soil disturbing construction activity must adhere to the requirements of Chapter 2. A detailed erosion control plan shall be shown in conjunction with the site-grading plan.

#### F. Detail Sheets

Detail sheets shall be provided as part of the Site Development Plans. The detail sheet shall show all City Standard Details and special details necessary for the project.

All Details shall be full size.

#### G. Other Requirements

Other information to be shown on the construction drawings or other submittals includes:

1. The design elements such as:
  - a. Street classification;
  - b. Design speed;
  - c. Super elevation;
2. Structural construction plans and the necessary calculations stamped by a structural engineer shall be submitted for proposed structures, as determined by the Director (i.e. walls, box culverts, bridges). A letter from the engineer approving installation of the structure shall be submitted prior to as-built approval.
3. Any additional information that the Director deems necessary to review the plans and assure compliance with design standards.

#### H. Preliminary Stormwater Plan

1. Purpose. The purpose of the preliminary stormwater plan is to allow the City to determine whether a proposal will meet the requirements of these standards

Projects creating  $\geq 5,000$  square feet of new or replaced impervious surfaces must include a preliminary stormwater plan. The preliminary stormwater plan submittal shall consist of:

- 1) A preliminary development plan.
- 2) A preliminary technical information report (Stormwater Report) prepared in the standardized format described in the sections below.

The preliminary stormwater plan shall identify how stormwater runoff, that originates on the site or flows through the site, is currently controlled and how this will change with the proposed development or redevelopment project.

The project engineer shall include a statement that all the required information is included in the preliminary stormwater plan and that the proposed stormwater facilities are feasible. All plans, studies, and reports that are part of the preliminary and final stormwater plans shall be signed and dated by the registered soil scientist and the professional civil engineer(s) (registered in the state of Washington) responsible for preparation of the report.

2. To ensure adequate public review and avoid multiple reviews of preliminary reports by City staff, the preliminary stormwater plan shall not be significantly modified after public notice of the final SEPA determination without issuance of a new SEPA determination.
3. Timing. A preliminary stormwater plan shall be submitted with a land use application.

4. **Preliminary Development Plan**

The preliminary development plan shall consist of 22-inch x 34-inch drawings and may be included in the design plans.

The preliminary development plan shall show the character of the existing site and proposed features, including but not limited to:

1. Existing and proposed property boundaries, easements, and rights-of-way.
2. Existing and proposed contours with a 2-foot maximum contour interval, unless the Director determines a lesser interval is sufficient to show drainage patterns and basin boundaries.
3. Offsite areas contributing runoff to the site.
4. Natural and manmade drainage features adjacent to the site, including existing and proposed (if known) stormwater facilities.
5. Existing onsite water wells, known agricultural drain tiles, areas of potential slope instability, structures, utilities, and septic tanks and drain fields.
6. Location of the 100-year floodplain, floodways, and shoreline management area limits on the site.
7. Existing water resource features on and adjacent to the site, including streams, wetlands, springs, sinks, and stormwater facilities.
8. Existing and proposed drainage flow routes for each threshold discharge area (TDA) to and from the site, including bypass flows.
9. Proposed location of structural source control BMPs, where applicable.
10. Point of discharge locations from the proposed project site that preserve the natural drainage patterns and existing outfall locations.
11. Areas of the project site where onsite stormwater management BMPs will be effectively implemented, including low impact development BMPs. The plan shall show the areas of retained native vegetation, required flow



- lengths, and vegetated flow paths for proper implementation of these BMPs.
12. All existing drainage facilities, including structural water quality or flow control BMPs and conveyance systems.
  13. Existing and proposed pollution-generating pervious surfaces (PGPS), including lawn, landscaped areas, and pasture areas.
  14. Existing areas of the site predominantly covered by native vegetation (i.e., native trees, shrubs, and herbaceous plants as defined by the Washington State Department of Ecology [Ecology]) and areas of native vegetation to be preserved under proposed conditions.
  15. Approximate location and size of proposed runoff treatment and flow control facilities implemented.
  16. The delineated wetland boundary (for sites that discharge stormwater to a wetland, either directly or indirectly through a conveyance system).
  17. A conceptual grading plan that verifies the constructability of a stormwater facility (for sites with slopes greater than 5 percent).
  18. The Director may require additional site or vicinity information if needed to determine the feasibility of the stormwater proposal.

## **5. Preliminary Stormwater Report (Stormwater Report)**

The preliminary Stormwater Report shall contain all technical information and analyses necessary to determine that the proposed stormwater facilities are feasible. The required contents of the preliminary Stormwater Report are identified below.

### **Table of Contents**

1. List of section headings and their respective page numbers.
2. List of tables with page numbers.
3. List of figures with page numbers.
4. List of attachments, numbered.
5. List of references.

### **Map Submittals**

All maps shall contain a scale and north arrow.

1. **Vicinity Map:** All vicinity maps shall clearly show the project site.
2. **Soils Map:** The soils map shall show soils within the contributing area that drains to the site itself. Soils maps may be obtained from the Washington soil survey data as available on the NRCS website (<http://soils.usda.gov/>). If the maps do not appear to accurately represent the soils on the site, the applicant is responsible for verifying the actual soils on the site.
3. **Other Maps:** The following additional maps shall be required in the situations noted:
  - Wellhead Protection. If the site lies within the 10-year time-of-travel zone of a public water supply well or within a Category I or II critical aquifer

- recharge area (CARA), maps showing all of the zones of contribution that overlap the site are required.
- Floodplains. If a floodplain mapped by the Federal Emergency Management Agency (FEMA) exists on or adjacent to the site, a map showing the floodplain is required.
  - Shoreline Management Area. If the site requires a shoreline permit, a map showing the boundary of the shoreline management area in relation to the site is required.

### **Section A – Project Overview**

1. Describe the site location.
2. Describe the topography, natural drainage patterns, vegetative ground cover, and presence of critical areas. Critical areas that receive runoff from the site shall be described to a minimum of ¼ mile away from the site boundary.
3. Identify and discuss existing onsite stormwater systems and their functions.
4. Identify and discuss site parameters that influence stormwater system design.
5. Describe drainage to and from adjacent properties.
6. For agricultural sites with drain tiles, discuss the impact of construction on the drain tiles, site drainage, and the impact of the drainage tiles on proposed stormwater facilities.
7. Describe adjacent areas, including streams, lakes, rivers, wetland and buffer areas, residential areas, and roads that might be affected by the construction project.
8. Generally describe proposed site construction, size of improvements, and proposed methods of mitigating stormwater runoff quantity and quality impacts.

### **Section B – Minimum Requirements**

If applicable, describe the land-disturbing activity and document the applicable minimum requirements for the project site. (See Chapter 4 of this manual for guidance.) Include the following information in table format:

1. The amount of existing impervious surface.
2. The amount of new impervious surface.
3. The amount of replaced impervious surface.
4. The amount of native vegetation converted to lawn or landscaping.
5. The amount of native vegetation converted to pasture.
6. The total amount of land-disturbing activity.

Provide a statement that confirms the minimum requirements that will apply to the development activity. For land-disturbing activities where minimum requirements 1 through 10 must be met:

1. Provide the amount of effective impervious area in each TDA, and document through an approved continuous runoff simulation model (e.g., the Western Washington Hydrologic Model [WWHM]) the increase in the 100-year flood frequency from pre-developed to developed conditions for each TDA.
2. List the TDAs that must meet the runoff control requirements listed in Minimum Requirement 6.
3. List the TDAs that must meet the flow control requirements listed in Minimum Requirement 7.
4. List the TDAs that must meet the wetlands protection requirements listed in Minimum Requirement 8.

### **Section C – Soils Evaluation**

1. Describe the site's suitability for stormwater infiltration for flow control, runoff treatment, and low impact development (LID) measures.
2. Identify water table elevations, flow directions (where available), and data on seasonal water table fluctuations with minimum and maximum water table elevations where these may affect stormwater facilities.
3. Identify and describe soil parameters and design methods for use in hydrologic and hydraulic design of proposed facilities.
4. Report findings of testing and analysis used to determine the infiltration rate.
5. Where unstable or complex soil conditions exist that may significantly affect the design of stormwater facilities, the Director may require a preliminary soils report that addresses stormwater design considerations arising from soil conditions. The preliminary soils report shall be prepared by a registered professional engineer, licensed in the state of Washington, proficient in geotechnical investigation and engineering or a registered soil scientist. The preliminary soils report shall include a soils map developed using the criteria set in the *NRCS National Soil Survey Handbook* (NRCS 2007) and the *SCS Soil Survey Manual* (SCS 1993), at a minimum scale of 1:5,000 (12.7 inch/mile).

### **Section D – Source Control**

If the development activity requires source control, identify the source control BMPs to be used with the land-disturbing activity.

### **Section E – Onsite Stormwater Management BMPs**

1. On the preliminary development plan or other maps, show the site areas where onsite stormwater management BMPs will be effectively implemented. If applicable, the plan must show the areas of retained native

- vegetation and required flow lengths and vegetated flow paths, as required for proper implementation of each onsite stormwater BMP. Arrows must show the stormwater flow path to each BMP.
2. Identify and describe geotechnical studies or other information used to complete the analysis and design of each onsite stormwater BMP.
  3. Identify the criteria (and their sources) used to complete analyses for each onsite stormwater BMP.
  4. Describe how design criteria will be met for each proposed onsite stormwater management BMP.
  5. Describe any onsite application of LID measures planned for the project. Provide a plan that shows the proposed location and approximate size of each LID facility.
  6. Identify and describe any assumptions used to complete the analysis.
  7. Describe site suitability, including hydrologic soil groups, slopes, area of native vegetation, and adequate location of each BMP.

#### **Section F – Runoff Treatment Analysis and Design**

1. Document the level of treatment required.
2. Provide background and description to support the selection of the treatment BMPs being proposed. Include an analysis of initial implementation costs and long-term maintenance costs.
3. Identify geotechnical or soils studies or other information used to complete the analysis and design.
4. Identify the BMPs used in the design, and their sources.
5. Summarize the results of the runoff treatment design and describe how the proposed design meets the requirements of the SMMWW.
6. Provide a table that lists the amount of pollution-generating pervious surfaces (PGPS) and pollution-generating impervious surfaces (PGIS).

#### **Section G – Flow Control Analysis and Design**

1. Identify the site's suitability for stormwater infiltration for flow control, including tested infiltration rates, logs of soil borings, and other information.
2. Identify and describe geotechnical or other studies used to complete the analysis and design.
3. If infiltration cannot be provided for flow control, provide the following additional information:
  - Identify the areas where flow control credits can be obtained for dispersion, LID, or other measures, per the requirements in the SMMWW.
  - Provide the approximate sizing and location of flow control facilities for each TDA, per Volume III of the SMMWW.

- Identify the criteria (and their sources) used to complete the analyses, including pre-developed and post-developed land use characteristics.
  - Include and reference all hydrologic computations, equations, graphs, and any other aids necessary to clearly show the methodology and results.
  - Include all maps, exhibits, graphics, and references used to determine existing and developed site hydrology.
4. Submit electronic copies of the WWHM (.wdm, .prj, .usi) project files upon request, if applicable.

## **Section H – Wetlands Protection**

For projects with stormwater discharges to a wetland and/or wetland buffer, either directly or indirectly through a conveyance system, the preliminary Stormwater Report shall describe wetland protection measures to be implemented. The narrative shall describe the measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

### **I. Final Stormwater Plan**

#### **A. Purpose**

The final stormwater plan shall provide final engineering design and construction drawings for the stormwater aspects of a proposed new development or redevelopment project. The final stormwater plan shall be submitted and approved by the Director before construction of the development can begin.

#### **B. Final Stormwater Plan Submittal**

The final stormwater plan submittal shall include the following:

1. Any conditions of approval from the land use process.
2. Any easements, covenants, or agreements necessary to permit construction.
3. Final engineering plans that provide sufficient detail to allow construction of the stormwater facilities. These plans shall be stamped, signed, and dated by the engineer(s), registered in the state of Washington, responsible for hydrologic, hydraulic, geotechnical, structural, and general civil engineering design and by the project engineer responsible for the preparation of the final stormwater plan. The final engineering plan shall show all utilities to ensure that conflicts between proposed utility lines do not exist.

4. The approved preliminary stormwater plan, with an explanation of any differences between the design concepts included in the preliminary and final stormwater plans. If a final stormwater plan differs from the approved preliminary stormwater plan in a manner that, in the opinion of the Director, raises material water quality or quantity control issues, it shall require another SEPA determination (if subject to the State Environmental Policy Act [SEPA]) and a plat alteration.
5. A final development plan (which may be a part of the final engineering plans or a separate plan). See the requirements identified below.
6. A final technical information report (Stormwater Report). See the requirements identified below.
7. A construction stormwater pollution prevention plan (SWPPP). See Section 3.5 below.

#### Final Development Plan

The final development plan shall be consistent with the preliminary development plan and may be combined with the final engineering plans. In addition to the information required in the preliminary development plan, the final plan requires the following information:

1. Threshold discharge area (TDA) delineations, and total impervious and pervious area delineations and acreages by TDA.
2. The acreage of pollution-generating pervious surfaces (PGPS) and pollution-generating impervious surfaces (PGIS) used in the hydraulic/hydrologic calculations both onsite and offsite that contribute surface runoff.
3. Directions and lengths of overland, pipe, and channel flow.
4. Outfall points from each TDA and overflow routes for the 100-year storm.
5. Onsite conveyance systems, including pipes, catch basins, channels, ditches, swales, and culverts.
6. Primary flow path arrows for drainage under developed conditions, with the calculated flow rates. Cross-reference the flow rates to the hydrological model output file used to calculate the flow rates.
7. Approved location for storm runoff from the building lots.
8. The Director may require additional site or vicinity information if needed to determine the feasibility of the stormwater proposal.

#### Final Stormwater Report

The final Stormwater Report shall be a comprehensive report, supplemental to the final engineering plans, that contains all technical information and analyses necessary to complete final engineering plans based on sound engineering

practices and appropriate geotechnical, hydrologic, hydraulic, and water quality design.

The final Stormwater Report shall be stamped, signed, and dated by the professional engineer(s), registered in the state of Washington, responsible for hydrologic, hydraulic, geotechnical, structural, and general civil engineering design.

The required contents of the final Stormwater Report, which is part of the final stormwater plan, are identified below.

#### Table of Contents

See the preliminary Stormwater Report requirements.

#### Map Submittals

See the preliminary Stormwater Report requirements.

#### Section A – Project Overview

Provide the information from the preliminary Stormwater Report, with the following additional elements:

1. Reference the conceptual design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual design contained within the final engineering plans.
3. Provide a narrative of how the goals of the amenity criteria are or are not satisfied.

#### Section B – Minimum Requirements

If applicable, provide the information from Section B of the preliminary Stormwater Report, revised as necessary for the final design. Confirm the applicable minimum requirements identified in the preliminary Stormwater Report. For land-disturbing activities where minimum requirements 1 through 9 must be met, provide the required information listed in Section B of the preliminary Stormwater Report, revised to reflect the final design.

#### Section C – Soils Evaluation

See the preliminary Stormwater Report requirements.

### Section D – Source Control

See the preliminary Stormwater Report requirements.

### Section E – Onsite Stormwater Management BMPs

Provide the information from the preliminary Stormwater Report, with the following additional elements:

1. Reference the conceptual design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual design contained within the final engineering plans.
3. For bioretention systems, provide the following:
  - a. The proposed soil matrix for the facility.
  - b. The planting plan, listing proposed plant types and locations.
  - c. Detail drawings, including the following:
    - If an underdrain is used, show drain rock, pipe, and filter fabric specifications.
    - All stormwater piping associated with the facility, including catch basin, pipe materials, sizes, slopes, and invert elevations.
    - Rain garden width, length, side slopes, and maximum design water depth.
    - Irrigation system, if installed.
    - Designs for any retaining walls proposed. Structural walls shall meet City building permit requirements.
4. For porous pavements, provide the following:
  - a. Supporting design calculations showing adequate infiltration rates to accommodate flows from all impervious surfaces directed onto any porous pavement.
  - b. Geotextile specification.
  - c. Base material gradation.
  - d. Asphalt or concrete mix design and void calculations.
  - e. Acceptance test procedures.
  - f. Detail drawings, including the following:
    - Geotextile
    - Base material
    - Asphalt or concrete layer
5. For reversed slope sidewalks, show the following:
  - Details on the planting plan for any areas receiving water from reversed slope sidewalks.
6. Describe how the project will fully implement required BMP T5.13, Soil Quality and Depth.



### Section F – Runoff Treatment Analysis and Design

For land-disturbing activities where runoff treatment facilities are required, provide the information from the preliminary Stormwater Report, with the following additional elements:

1. Reference the conceptual runoff treatment design proposed in the preliminary stormwater plan.
2. Identify revisions to the conceptual runoff treatment design contained in the preliminary stormwater plan.
3. Complete a detailed analysis and design of all proposed runoff treatment system elements, in accordance with Volume V of the WWM. Reference runoff treatment system elements to labeled points shown on the site location map or final development plan.
4. Include and reference all computations, equations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design water quality system elements in the technical appendix.
5. Summarize the results of the runoff treatment design, and describe how the proposed design meets the requirements of the SMMWW.

### Section G - Flow Control Analysis and Design

For land-disturbing activities where flow control facilities are required:

1. Identify revisions to the conceptual design proposed in the preliminary stormwater plan.
2. Identify initial conditions, including stream base flows, beginning water surface elevations, hydraulic or energy grade lines, initial groundwater elevations, beginning storage volumes, and other data or assumptions used to complete the analyses of initial conditions. Reference the sources of information.
3. Describe any assumptions used to complete the analysis, including flow credits through the use of onsite stormwater BMPs or LID measures.
4. Complete a detailed hydrologic analysis for existing and developed site conditions, in accordance with the requirements of Chapter 2, Volume III of the SMMWW, using an approved continuous runoff simulation model. Compute pre-developed and developed flow durations for all subbasins. Provide an output table from the continuous flow model, including the following:
  - a. Flow rates for the 2, 10, and 100-year return periods for pre-developed and developed conditions.
  - b. A table listing the pass/fail rates for each flow level where duration statistics were calculated.

- c. A graph showing the flow rate on the y axis and percent time exceeding on the x axis for pre-developed conditions and post-developed mitigated conditions, from 50 percent of the 2-year through the 50-year flow rate.
5. Provide a hydraulic analysis of pipes and/or channels that lead to and/or from the outlet structure. The analysis should confirm the capacity of pipes and channels to convey the peak flow rates for the 2, 10, 50, and 100-year return period flow rate with the water surface elevation of the pond at the elevation for those return period flow rates.
6. Submit electronic copies of the WWHM (.wdm, .prj, .usi) project files to allow reviewers to run the model and confirm the model results.
7. Refer to labeled points shown on the site location map and development plan.
8. Include and reference all hydrologic and hydraulic computations, equations, rating curves, stage/storage/discharge tables, graphs, and any other aids necessary to clearly show the methodology and results.
9. Include all maps, exhibits, graphics, and references used to determine existing and developed site hydrology.

#### Section H - Flow Control System Plan

1. Provide an illustrative sketch of the flow control facility and its appurtenances.
2. Show basic measurements necessary to confirm storage volumes.
3. Show all orifice, weir, and flow restrictor dimensions and elevations.
4. The sketch shall correspond with final engineering plans. Alternatively, a final site grading plan that incorporates the above information may be included as an attachment to the final stormwater plan.
5. Provide electronic copies of the drawings used for analysis, measurement, and design inputs for the hydrologic analysis submitted with the final drawing in one of the following approved file formats: Portable Document Format (.pdf) or AutoCAD (.dwg, .dxf).

#### Section I – Wetlands Protection

For projects with stormwater discharges to a wetland or wetland buffer, either directly or indirectly through a conveyance system, the Stormwater Report shall describe wetland protection measures to be implemented, in accordance with Minimum Requirement 8. The narrative shall describe the measures that will maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses.

### Section J – Other Permits

Construction of roads and stormwater facilities may require additional permits from other agencies. These permits may contain requirements that affect the design of the stormwater system. Approved permits that are critical to the feasibility of the stormwater facility design shall be included in this section.

### Section K – Conveyance Systems Analysis and Design

1. Reference the conceptual drainage design proposed in the preliminary stormwater plan.
2. In the technical appendix, include and reference all computations, equations, charts, nomographs, detail drawings, and other tabular or graphic aids used to design water quality system elements.
3. Identify revisions to the conceptual drainage design contained in the preliminary stormwater plan.
4. Identify the criteria used to complete the analyses and their sources.
5. Identify and discuss initial conditions, including stream base flows, beginning water surface elevations, hydraulic or energy grade lines, beginning storage elevations, and other data or assumptions used to complete the analyses of initial conditions. Reference the sources of information.
6. Describe any assumptions used to complete the analyses.
7. Complete a detailed hydraulic analysis of all proposed collection and conveyance system elements and existing collection and conveyance elements, including outfall structures and outlet protection that influence the design or are affected by the proposal, in accordance with Section 4.05 of these standards. Identify, compute, reference, verify, summarize and tabulate the following:
  - a. Design flows and velocities and conveyance element capacities for all conveyance elements within the development.
  - b. The 10-year recurrence interval stage for detention facility outfalls. Provide stage-frequency documentation from WWHM.
  - c. The existing 100-year floodplain elevations and lateral limits for all channels, and no net loss of conveyance or storage capacity from development.
  - d. The conveyance system elements to labeled points shown on the site location map or development plan.
  - e. The capacity of each conveyance system element to convey design flow and discharge at non-erosive velocities and the capacity of the onsite conveyance system to convey design flows that result from ultimate build-out of upstream areas.
  - f. All hydraulic computations, equations, pipe flow tables, flow profile computations, charts, nomographs, detail drawings, and other tabular

or graphic aids used to design and confirm the performance of conveyance systems.

- g. The results of system analyses, and how the proposed design meets the requirements of these standards.

#### Section L – Offsite Analysis

If applicable, provide the results of an offsite analysis prepared in accordance with Chapter 4 (Offsite Analysis and Mitigation) of this manual (see exemptions in Chapter 4.)

#### Section M—Approval Conditions Summary

List each preliminary approval condition related to stormwater control, wetlands, wetland buffers, floodplains, and other water-related issues and explain how the final design addresses or conforms to each condition.

#### Section N – Special Reports and Studies

Where site-specific characteristics, such as critical areas as described in the KMC, present difficult drainage and water quality design problems, the Director may require additional information or the preparation of special reports and studies that further address the specific site characteristics, the potential for impacts associated with the development, and the measures that would be implemented to mitigate impacts. Special reports shall be prepared by professionals with expertise in the particular area of analysis, who shall date, sign, stamp, and otherwise certify the report. Subjects of special reports may include, but are not be limited to:

1. Geotechnical
2. Wetlands
3. Floodplains and floodways
4. Groundwater
5. Structural design
6. Fluvial geomorphology (erosion and deposition)

All special reports and studies shall be included in the technical appendix.

#### Section O – Groundwater Monitoring Program

Where required, a groundwater monitoring program shall be included in the final stormwater plan. The groundwater monitoring program shall be prepared by a person with expertise in groundwater contamination investigation, prevention, and monitoring and shall clearly describe a comprehensive groundwater testing and evaluation program designed to ensure compliance with federal and state of

Washington laws and these standards. The Director will review proposed groundwater monitoring programs on a site-specific basis.

#### Section P – Maintenance and Operations Manual

The project engineer shall attach the maintenance manual required in Chapter 4 of this Manual.

#### Technical Appendix

1. All Stormwater Reports shall contain a technical appendix that includes all computations completed in the preparation of the Stormwater Report, together with copies of referenced data, charts, graphs, nomographs, hydrographs, stage-storage discharge tables, maps, exhibits, and all other information required to clearly describe the stormwater flow control and runoff treatment design for the proposed development activity. The format of the technical appendix shall follow as closely as possible the section format of the Stormwater Report and shall be adequately cross-referenced to ensure that the design may be easily followed, checked, and verified. The technical appendix shall also contain all special reports and studies, other than those included as attachments to the Stormwater Report.

#### J. Transportation Impact Study

1. Purpose. The transportation impact study is an analysis prepared to determine the transportation impacts of a given development.
2. Timing. A transportation impact study shall be submitted with the land use application as required in section 1.04K.
3. Contents. The transportation impact study will typically include the following. The Director may require more or less depending on the size and/or anticipated impacts of the development as required in section 3.01.
  - a. Analysis approach and methods - The traffic study approach and methods should be guided by the following criteria:
    - (i) Study Area – As a rule, the analysis must include any intersection or roadway segment, regardless of jurisdictional boundaries, to which at least 10 project trips would be added during the peak hour of trip generation (or 100 daily trips). Projects just meeting the minimum threshold for traffic impact analysis will normally require analysis of only the intersection(s) or roadway segment(s) adjacent to the site. Larger developments will require the analysis of more intersections. Some larger developments will require application of the urban area

traffic model which is developed and maintained by the Cowlitz-Wahkiakum Council of Governments. In addition to off-site intersections, it is important that the TIA address the intersections/driveways proposed to provide access to the site. The Director must approve the study intersections and roadways.

- (ii) Study Horizon Years – The study horizon year shall be the year the project is to be completed and operational. If the project requires a zone change, the horizon year shall be ten (10) years from the date of the study, and include a “no-build” analysis for comparative purposes.
- (iii) Analysis Time Period – Both the morning and evening weekday peak hours, 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., shall be analyzed, unless the proposed project is expected to generate no trips, or a very low number of trips, during either the morning or evening peak periods. If this is the case, the requirement to analyze one or both of these periods may be waived by the Director. Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example mid-day), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, it is up to the discretion of the Director if those time periods should be included for analysis.
- (iv) Geometrics and Traffic Control – Roadway geometric conditions within the study area should include, but not be limited to, intersection and driveway spacing, roadway width, traffic lanes, turn lanes, medians, curb and gutter, speed limits, horizontal and vertical curvature, traffic control devices, and traffic signal phasing (if traffic signals are present). The discussion on geometric conditions should include locations of driveways and intersections across the street from the development, and how this may impact traffic operations.
- (v) Sight Distance – To identify potential safety issues associated with site access and egress, sight distance at intersections (stopping sight distance and corner sight distance) measurements shall be conducted at the proposed site driveway(s). The measured sight distance shall be compared to minimum requirements, as established by the American Association of State Highway and Transportation Officials (AASHTO). A summary of sight distance analysis should be presented in tabular form and included in the TIA.
- (vi) Traffic Volumes – When directed by the City’s representative, the traffic volumes for the analysis hours should be adjusted for the peak season, in cases where seasonal traffic data is available.

- (A) Data Collection Requirements – All data should be collected in accordance with the latest edition of the ITE Manual of Traffic Engineering Studies, or as directed by the City of Longview's Traffic Engineer.
- (B) Turning Movement Counts – Manual turn movement counts shall be collected at all study area intersections to determine the base traffic conditions. These turning movement counts should typically be conducted during the weekday (Tuesday through Thursday) between 7:00 a.m. – 9:00 a.m. and 4:00 p.m. – 6:00 p.m. and for other periods depending upon the proposed and/or surrounding land uses. Historical turning movement counts may be used if the data is not more than 12 months old at the time of the TIA. In high traffic locations where congestion is present or traffic peaks early or late, extended or altered count periods may be required. Turn movement counts may be required during other periods as directed by the City's representative.
- (C) Daily Traffic Volumes – Daily traffic volumes should be provided as 24-hour volumes (one hour increments), and peak period volumes (15 minute increments) at intersections and driveways should be provided as turning movements. The analysis shall be based on traffic counts that are no more than 12 months old (or less if there are significant changes in traffic patterns). If current traffic volume data is not available from the City, the consultant shall be responsible to collect all necessary data. The estimation of existing peak hour turn movements based on automatic machine counts is not acceptable.
- (D) Pedestrian and Bicycle Volumes – Pedestrian and bicycle data will be included with all peak period intersection turn movement counts. Pedestrian data will be collected for each crossing movement of each leg of the intersection, while bicycle data will be collected by approach leg of the intersection.
- (vii) Crash Data – Within the study area for each TIA, a crash history evaluation shall be conducted for the most recent three-year period. The intent of the evaluation is to identify any apparent trends in the data that reflect a safety issue that may be exacerbated by the proposed development and to identify mitigation(s) to resolve the issue(s). At a minimum, the analysis shall summarize the number of crashes per year, location of crash (intersection), direction of the vehicles, type of crash, severity and fatalities. Any pedestrian and/or

bicycle collisions within the corresponding analysis period should be identified separately. Intersection crash rates shall be calculated and evaluated based on estimated million entering vehicle at the intersection. The engineer shall assess the overall results of the safety analysis. The Director may request a crash diagram be drawn.

- (viii) Traffic Volume Forecasts – Future traffic volumes should be estimated using information from transportation models, or applying an annual growth rate to the base-line traffic volumes. The future traffic volumes should be representative of the horizon year for project development. If the annual growth rate method is used, the Director must give prior approval to the growth rate. In addition, any nearby proposed approved development projects should be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed approved projects should be compared to the increase in traffic by applying an annual growth rate. This information should be provided by the Director. If modeling information is unavailable, the greatest traffic increase from either the approved developments, the application of an annual growth rate, or a combination of an annual growth rate and approved developments, should be used to forecast the future traffic volumes. It is up to the discretion of the Director to select the appropriate methodology from information provided for all methods from the applicant.
- (ix) Analysis Scenarios – To determine the potential traffic impacts of a proposed development the following scenarios shall be analyzed in the TIA when appropriate:
  - (A) *Existing Conditions* - Existing traffic operations based on recent traffic count data.
  - (B) *Existing + Approved Conditions* - Projected traffic operations reflecting changes to existing traffic volumes due to relevant approved developments. Approved development traffic is defined as traffic generated by all developments approved by local jurisdictions or submitted to local jurisdictions for approval within the development vicinity at the time of the TIA submittal.
  - (C) *Existing + Approved Conditions + Project* - This scenario is similar to scenario B with the addition of the proposed project traffic at study area intersections. If the development is expected to be completed beyond 12 months after the TIA is submitted, the Director may require an additional scenario of



analysis, which would include regional growth on traffic beyond existing levels. This scenario would have an appropriate growth applied to existing traffic volumes to forecast the planning horizon (build-out) year.

- (x) Trip Generation – To determine the impacts of a proposed development on the surrounding transportation network, the trip generation characteristics of that development must be estimated. Trip generation characteristics should be obtained from one of the following acceptable sources:
  - (A) Institute of Transportation Engineers (ITE) *Trip Generation* manual (latest edition).
  - (B) Specific trip generation studies that have been conducted for the particular land use for the purposes of estimating peak hour trip generating characteristics, subject to approval by the Director prior to their inclusion in the transportation impact analysis. In addition to new site generated trips, several land uses typically generate additional trips that are not added to the adjacent traffic network. These trips include pass-by, diverted and internal trips, and are considered to be separate from the total number of net new trips generated by the proposed development. The procedures listed in the (ITE) *Trip Generation Handbook* should be used where appropriate to account for pass-by, diverted and internal trips. The applicant's engineer shall not use any pass-by, diverted or internal trip reductions without prior approval of the method or data sources by the Director.
- (xi) Trip Distribution and Assignment – Projected trips should be distributed and added to the projected non-site traffic on the roadways and intersections under study. The specific assumptions and data sources used in deriving trip distribution and assignment should be documented in the TIA and approved by the Director prior to submittal of the TIA. The site-generated traffic should be assigned to the street network in the study area based on the approved trip distribution percentages. Trip assignments should be rounded to the nearest five percent (5%). Graphic presentations, as well as discussions in text, of the trip assignment shall be documented in the TIA.
- (xii) Capacity Analysis – An intersection capacity analysis is required as part of the TIA submittal. The software used for this analysis shall be

the latest edition of the Highway Capacity Software (HCS), or a comparable software analysis program that is based on the *Highway Capacity Manual* methodology.

Peak hour Level-of-Service (LOS) must be calculated for each study intersection (existing and proposed). In most cases, the weekday morning (AM) and weekday evening (PM) peak hours must be included in the analysis. For certain types of development (e.g., recreation facilities, churches, some retail uses) some peak hours may be added (e.g., midday or weekends) or eliminated (e.g., AM peak hour for low traffic generators) from the analysis, if approved by the Director. Unless determined otherwise by the Director, compliance with the LOS standards will be based solely on weekday AM and PM peak hour traffic analysis results. For unsignalized intersections, appropriate MUTCD (*Manual on Uniform Traffic Control Devices*, FHWA) peak hour signal warrants must also be checked for each scenario.

The results of the above analysis shall be summarized in tabular form identifying the average delay, Level-of-Service (LOS), and volume-to-capacity (V/C) ratios for the study intersection. All intersections and specific turning movements with a LOS D or worst shall be clearly identified.

- (xiii) Queue Analysis – Queue lengths shall be calculated for each lane of all approaches to signalized intersections for the 95<sup>th</sup> percentile queue during the peak hour of analysis. Queue lengths shall also be calculated for unsignalized locations, such as site driveways, where standing queues can interfere with other movements, especially if such interference can contribute to safety deficiencies. Appropriate analysis methods should be used that account for the actual arrivals of vehicles at an intersection. The methodology for queuing at unsignalized intersections or driveways must be approved by the Director prior of the TIA.
- (xiv) Left/Right Turn Storage Analysis – Left-turn and right-turn storage bay analyses must be performed at all study intersections and project driveways identified in the traffic study scope. Storage at signalized intersections is to be calculated utilizing the Poisson method with 95% confidence and a 150 second wait. Storage at unsignalized intersections and driveways with either a dedicated left turn lane or a two-way-left-turn-lane is to be calculated utilizing the graphs found in the Washington State Department of Transportation's Design Manual.

For signalized intersections, queue lengths shall be based on average vehicle length of twenty-five (25) feet, or longer where appropriate.

- (xv) Traffic Simulation – For a major development, a simulation using SimTraffic or other approved software should be done to show existing traffic flows and future traffic flows if directed by the Director.
- (xvi) Access and Site Circulation Analysis – Describe the proposed access to the site for all travel modes. This includes identifying the existing and/or proposed access locations from the public street system and the expected use of each access (pedestrian/bicycle entrance, truck delivery access, etc.). Also describe any proposed roadways within the site and the internal street system configuration.

Summarize the sight distance evaluation conducted at the site accesses. Include the sight distance standards that need to be met and the measured available sight distance in both directions at each site driveway. The sight distance standard should be based on recent 85th percentile speed data conducted along the project frontage. Demonstrate that an adequate vision clearance triangle can be provided at each driveway. Provide the findings of the site access sight distance evaluation and any recommended improvements that may be needed.

Summarize the access spacing evaluation of the proposed site driveways. Provide the applicable City standards for each frontage roadway and site driveways. This analysis should be conducted for both existing and proposed site access locations.

Provide a detailed evaluation of the proposed site plan associated with on-site circulation needs for all modes of travel. This should include the following elements.

- Determine if the number of driveways can adequately and safely accommodate the peakhour vehicle demand.
- Evaluate driveway and cross street alignment and possible conflicts of movement.
- Evaluate the need for separate turn lanes to accommodate vehicles exiting the site and the potential for on-site vehicle queues to impact internal circulation.

- Review the internal roadway system to verify that emergency vehicles and trucks (potential demand based on land use) can be accommodated. Developments with a potential for generating large trucks should provide a turn template analysis of the site plan. The turn template analysis should be provided in the technical appendix.
  - Identify how pedestrian and bicycle trips are accommodated between building entrances and parking lot areas. Internal pedestrian and bicycle circulation should be clearly demonstrated on the site plan. Discuss potential conflicts between pedestrians, bicycles and motor vehicles. Identify any land uses (if within one-half mile of site) that would likely generate pedestrian and bicycle trips in association with the proposed project. For example, a proposed subdivision located near a park. Pedestrian and bicycle connections to off-site destinations should be clearly demonstrated on the site plan. Discuss potential conflicts between pedestrians, bicycles and motor vehicles.
- (xvii) Mitigation Requirements – For every significant impact, the TIA must identify and discuss mitigation measures at conceptual level that will be implemented by the proposed development. The TIA may identify a mitigation measure or develop a range of mitigation measures for each impact to improve the performance of the transportation system. Mitigation measures shall be specific and feasible actions that will actually improve adverse transportation conditions, and shall comply with the city's design standards. The mitigation measures shall improve conditions or correct capacity deficiencies to acceptable levels of service. The TIA should discuss whether the measure reduces the impact to a less-than-significant level, and should report the conditions after the implementation of the mitigation measure.

An effective measure shall adequately avoid, minimize, rectify, or compensate an impact. It shall be consistent with local plans and policies.

Mitigation measures may include traffic control devices and roadway design features. The Consultant shall determine the need for new traffic control devices, and roadway design features based on the City's traffic engineering policies and procedures. The installation of traffic control devices and construction of roadway design features

shall conform to the City of Longview's standards and traffic engineering rules and regulations.

In addition, mitigation measures shall address vehicular queues, progression quality, and other factors that affect traffic conditions that are not part of the LOS analyses. They shall consider traffic operations at intersections and driveways.

- b. Report Format –For consistency, the TIA report shall follow the outline described below. The Public Works Department and Community Development Department staff will review and comment on the TIA report.

- (i) The consultant shall also provide a CD which contains the following:

- (A) A PDF version of the TIA
    - (B) A separate folder containing graphic files (i.e. JPG, BMP, TIFF format) of all graphics included in the TIA
    - (C) A separate folder containing the electronic files (i.e. SYNCHRO, HCS) for all analysis.
    - (D) A separate folder containing the electronic files for new traffic counts. The file format shall be .CSV. The count interval for both daily and peak counts shall be 15 minutes.

- (ii) The consultant shall furnish three (3) copies of the TIA report stamped by a traffic engineer to the City. The following is the order and format for the TIA report.

- 1. EXECUTIVE SUMMARY**

- a. Purpose of Report and Study Objectives
          - b. Site Location and Study Area
          - c. Development Description
          - d. Principal Findings
          - e. Conclusions including mitigations

- 2. TABLE OF CONTENTS**

- 3. LIST OF FIGURES**

- 4. INTRODUCTION**

- a. Explanation of the project
          - b. Area map showing development site location
          - c. Complete project site plan, with buildings identified as to proposed use. Driveways located on adjacent property

and across the street from the proposed project shall be shown on the site plan.

d. Project schedule, and stages or phase, if applicable

**5. EXISTING CONDITIONS**

- a. Study Area
- b. Existing Land Use Map. As a minimum, general land uses identified shall include residential, office/business, industrial, and retail.
- c. Roadway System
- d. Pedestrian/Bicycle Facilities
- e. Transit
- f. Sight Distance
- g. Existing Land Use

**6. EXISTING TRAFFIC DATA**

- a. Traffic Counts
- b. Pedestrian Counts (if necessary)
- c. Bicycle Counts (if necessary)
- d. Times Collected
- e. Locations
- f. Types - Daily, Morning, and Afternoon Peak Periods (two hours minimum, and others as required)
- g. Crash analysis
  - 1. Analysis Years
  - 2. Tabular Crash Report containing the following information:
    - a. Types of Crashes
    - b. Severity (Fatal, Injury, Property Damage Only)
    - c. Vehicular direction of travel
    - d. Time of Day
    - e. Day of Week
  - 3. Crash diagrams

**7. EXISTING TRAFFIC OPERATIONS**

- a. Level of Service -.Morning Peak Hour, Evening Peak Hour (and other as required)
- b. Traffic Signal Warrant Analysis
- c. Queue Analysis

**8. EXISTING TRAFFIC OPERATIONS + APPROVED CONDITIONS**

- a. Level of Service -.Morning Peak Hour, Evening Peak Hour (and other as required)
- b. Traffic Signal Warrant Analysis
- c. Queue Analysis

**9 TRIP GENERATION**

- a. Trip Generation
- b. Pass-by Traffic (if applicable)

**10. TRIP DISTRIBUTION AND ASSIGNMENT**

- a. Trip Distribution
- b. Trip Assignment

**11. EXISTING TRAFFIC OPERATIONS + APPROVED CONDITIONS + PROPOSED PROJECT**

- a. Level of Service – Morning Peak Hour, Evening Peak Hour (and other as required)
- b. Traffic Signal Warrant Analysis
- c. Queue Analysis
- d. Left/Right Turn Storage Analysis
- e. Traffic Simulation

**12. ACCESS AND SITE CIRCULATION ANALYSIS**

- a. Site access
- b. Site access sight distance
- c. Access spacing
- d. Internal site circulation

**13. SUGGESTED TRAFFIC MITIGATIONS**

- a. Traffic Control Needs
- b. Intersection Channelization Mitigation
- c. Pedestrian/Bicycle Considerations
- d. Neighborhood Traffic Mitigation

**14. CONCLUSION AND RECOMMENDATIONS**

**15. TECHNICAL APPENDIX**

- a. Traffic Volume Counts
  - 1. Average Daily 24 Hour Traffic Volumes
  - 2. Peak Hour Turning Movement Volumes (AM, PM and other as required)
- b. Capacity Analyses Worksheets
  - 1. Existing Condition
  - 2. Existing + Approved Conditions
  - 3. Future +Existing + Approved Conditions
  - 4. Future +Existing + Approved Conditions + Proposed Project
- c. Traffic Signal Warrant Analysis
- d. Accident Data and Summaries
- e. Miscellaneous Addendum

**K. Street Access Connection Permit**

If the new development, or change in use, will generate or create an increase of more than 10 Peak Hour Trips (as defined within the Institute of Transportation Engineers Trip Generation

Manual1), each application for a street access connection permit, whether accompanying an underlying land use application or not, shall include the following unless the Director has waived the requirement:

1. Transportation Impact Study — Per section 1.04J of these standards
2. Existing Conditions Plan – The applicant shall provide a map or plan illustrating the following conditions on both sides of all streets:
  - a. Existing driveways
  - b. Existing sidewalks
  - c. Surrounding off-site conditions
  - d. Street depictions with names of streets for identification
  - e. Existing roadway classifications
  - f. Three Year accident history

If none of these cases apply, a TIA may still be necessary if the Director deems that special circumstances require analysis (e.g., existing traffic congestion, safety concerns, public controversy, etc.). Conversely if any of these cases apply, the Director may waive the requirement of a TIA, or require less analysis than would be required for a full TIA, depending on the situation.

#### L. Project Acceptance and Closeout

Prior to acceptance of any and/all public improvements, the following shall be submitted to the Director for review and approval:

1. Final plat showing:
  - a. Plat layout
  - b. Right-of-way dimensions including all curves
  - c. Public easements
  - d. Public tracts
  - e. Required notes
2. As-built drawings: The drawings shall be mylars and be identical to the approved construction drawings with all inverts, rims, and any other necessary changes noted to their as-built status. A signed as-built note shall be placed on every page that has been changed.
3. CD copy containing:
  - a. Pdf version of the as-built drawings
  - b. Electronic copy of the development in .dwg format.

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1 Institute of Transportation Engineers Trip Generation Manual, 7<sup>th</sup> Edition, 2003.



4. Copy of a receipt from the finance department showing that all required engineering fees have been paid.

### **1.05 Professional Qualifications**

Professionals in the technical fields of Civil Engineering, Electrical Engineering, Geotechnical Engineering, Landscape Architecture, Soils Engineering, Structural Engineering, and Surveying who prepare or are responsible for the process of obtaining required permits/approvals shall be currently licensed or registered in the State of Washington and qualified by both experience and educational background in the specific technical areas as warranted by the specific needs of the proposed development project.

### **1.06 Changes to these Engineering Standards**

From time to time changes may be needed to add, delete, or modify the provisions of these Standards. The Director may propose changes to these Standards and upon approval of the City Council; they shall become effective and shall be incorporated into the existing provisions.

### **1.07 Design Modification Process**

#### **A. Submittal**

Requests to modify City Standards shall be submitted in writing by the Applicant's engineer to the Director. This written request shall state the desired modifications(s), the reason(s) for the request(s) and a comparison between the specification(s), standard(s), and the modification(s).

Any request for modification or variance of City Standards should be documented with reference to nationally accepted specifications/standards.

#### **B. Review**

The request to modify shall be reviewed by the Director, who shall consult the appropriate review authorities and make one of the following decisions:

1. Approve as is,
2. Approve with changes, or
3. Deny with an explanation.

The modification, if approved, is for project specific use. Approval of a request shall not constitute a precedent.

**C. Appeal**

The applicant may appeal the Director's decision to the Hearing Examiner.

**D. Criteria for Modification of Specification Standards**

1. The Director may grant a modification to the adopted specifications or standards when any one of the following conditions are met:
  - a. The specification or standard does not apply in the particular application.
  - b. Topography, right-of-way, or other geographic conditions impose an unusual or unique hardship on the applicant and an equivalent alternative which can accomplish the same design is available that does not compromise public safety or accessibility for the disabled.
  - c. A change to a specification or standard is required to address a specific design or construction problem which if not enacted will result in an undue hardship or would jeopardize public safety.

**1.08 Securities**

Securities shall be in accordance with the Procedures Manual.

**1.09 Errors and Omissions**

At the discretion of the City, any significant errors or omissions in the approved plans or information used as a basis for such approvals may constitute grounds for withdrawal of any approvals and/or stoppage of any or all of the permitted work. It shall be the responsibility of the Applicant to show cause why such work should continue, and make such changes in plans that may be required by the City before the plans are re-approved.

**1.10 Inspection**

**A. General Requirements**

1. Work performed within the public right-of-way, or as described in these Standards, whether by or for private applicant, by City forces, or by a City Contractor, shall be done to the satisfaction of the City and in accordance with the WSDOT Standard Specifications, any approved plans, the procedures manual and these Standards. Unless otherwise approved, any revision to construction plans must be approved by the City before being implemented.
2. The City shall have authority to enforce the Standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants, and inspectors as necessary to inspect the work and they will exercise such authority as the Director may delegate.

3. It is the responsibility of the Applicant, Contractor, or their agents to have an approved set of plans, and/or permits on the job site wherever work is being accomplished.
4. It is the responsibility of the Applicant, Contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction conference and/or field review shall be required before the commencement of any work.
5. Failure to comply with the provisions of these standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

B. Substitution of Materials

It is not the intent of these Standards to exclude other equipment or materials of equal value, quality, or merit. Whenever a product is designated, or manufacturer's name, brand, or item designation is given or described, it shall be understood that the words "or approved equal" follows such name, designation, or description, whether in fact they do so or not. Determination of quality in reference to the project design requirement will be made by the Director. A Contractor shall not use an "equal" product without prior written approval of the Director.

C. City Inspector's Activities

Inspecting services provided by the City shall include:

1. Monitoring both work progress and performance testing results.
2. The performance of administrative and coordination activities, as required, to support the processing and completion of the project.
3. The issuance of a corrective notice to the Contractor to make corrections to the work. The City's Project Inspector, at the discretion of the Director, may post a stop work order.
4. Maintaining a completion file containing the following:
  - a. The original of the project completion certification;
  - b. A complete copy of the report file initialed by the City's Project Inspector;
  - c. The results of material tests, compaction tests, and soil analysis as detailed in the construction file.

5. Inform the Director of all proposed plan changes, material changes, corrective notices, stop work orders, or errors or omissions in the approved plans or specifications as soon as practical. Any revision approved plans must be under the direction of the Engineer. It shall be at the discretion of the City's Project Inspector as to whether the revision is significant enough to warrant review by the Director. If so, the Applicant's engineer shall submit five (5) copies. No work affected by the revision shall be done until approved by the Director.

## **1.11 Contractor's Responsibility for Scheduling**

### **A. Sequence of Operations**

1. The Contractor shall plan construction work and execute operations with a minimum of interference with the operation of the existing public facilities, including but not limited to, water, sewer, and roads. It may be necessary to do certain parts of the construction work outside normal working hours in order to avoid undesirable conditions, and it shall be the obligation of the Contractor to do this work at such times. This scheduling, however, is subject to the City's approval and does not relieve the Contractor from making work available for inspection.
2. The Contractor shall notify the City at least 48 hours (two full working days) prior to any City inspection. Connections between existing work and new work shall not be made until necessary inspection and tests have been completed on the new work and it is found to conform in all respects to the requirements of the plans and specifications.
3. Construction hours shall be seven (7) am to six (6) pm for all construction of all public improvements and within public right-of-way and seven (7) am to ten (10) pm for construction of private improvements outside of right-of-way, unless otherwise approved by the Director.

### **B. Step Inspections**

1. The following items of work shall be inspected by City forces:
  - a. For street or sidewalk work, subgrade shall be inspected by the City (and tested by the Contractor) prior to placement of crushed surfacing.
  - b. Crushed surfacing shall be inspected by the City (and tested by the Contractor) prior to placement of paving, curb, or sidewalks.
  - c. Notify the City prior to the placement of any paving, curb, or sidewalks.
2. Other items of inspection notification are included under the various items of work outlined in these Standards.

**C. Progress of Construction**

1. Construction shall proceed in a systematic manner that will result in a minimum of inconvenience to the public.
2. In the case of a pipe-laying job for sanitary sewer, storm drainage, and water improvements the trenching equipment at no time shall be greater than 100 feet ahead of the pipe-laying crew, unless given permission by the Director.
3. The trench shall be backfilled so that no section of the trench or pipe is left open longer than 24 hours. Trenches located in a right-of-way or public street shall be completely backfilled and cold patched, or securely plated before the Contractor leaves the site each day. All piping is to be plugged with a serviceable expansion plug at the end of each workday.

**1.12 Contractor's Requirement for Testing**

Testing shall be in accordance with the WSDOT Standard Specifications and performed by a certified independent testing lab hired by the Applicant or Applicant's contractor with the results being supplied to the Director. The Applicant shall pay the cost of all testing.

The testing is not intended to relieve the Contractor from any liability for the trench restoration. It is intended to show the inspector and the City that the restoration meets these specifications. Testing shall include but not be limited to:

**A. Asphalt Testing**

Compaction of all lifts of asphalt as specified in the WSDOT Standard Specifications. Number of tests required:

1. For streets provide one (1) test per every 5,000 square feet of surface area.
2. For surface restoration of utility trenches provide one (1) test per every 200 feet of trench.

**B. Subgrade and Crushed Surfacing Testing**

Compaction testing as specified in the WSDOT Standard Specifications. Number of tests required:

1. For streets provide one test of the subgrade and one test of the crushed surfacing for every 5,000 square feet of surface area of pavement, curb, and sidewalk.

### C. Bedding and Backfill for Utility Trenches

Compaction testing as specified in the WSDOT Standard Specifications. Number of tests required:

1. For utility trenches provide one test at top of bedding for every 500 feet of trench.
2. For utility trenches provide one test for each lift of backfill for every 500 feet of trench.

### D. Embankment for Subgrade

Compaction testing as specified in the WSDOT Standard Specification. Number of tests required:

1. For each location where the fill is deeper than two (2) feet or greater than 300 cubic yards, provide one test per every two (2) vertical feet and every 500 cubic yards.

## 1.13 Safety Requirements

The Contractor is responsible for observing the safety of the work and all persons and property coming into contact with the work. The Contractor shall conduct his/her work in such a manner as to comply with all the requirements prescribed by OSHA.

The City Project Inspector's role is not one of supervision or safety management, but is one of observation only. Nothing contained in this section or elsewhere in the book shall be interpreted to obligate the City to act in any situation, nor shift the Owner's responsibility for safety compliance to the City. No responsibility for the safety of the work or for construction means, methods, techniques, sequences, or procedures shall attach to the City by virtue of its action or inaction under this section.

## 1.14 Preservation, Restoration, and Cleanup

### A. Site Restoration and Cleanup

1. The Contractor shall keep the premises clean and orderly at all times during the work and leave the project free of rubbish or excess materials of any kind upon completion of the work. During construction, the Contractor shall stockpile excavated materials so as to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, trees, or fences, regardless of the ownership of these areas. All excavated materials shall be removed from these areas, and these surfaces shall be left in a condition equivalent to their original condition and free from all

rocks, gravel, boulders, or other foreign material. Stockpiling of construction materials shall not be allowed on existing public rights-of way.

2. All existing storm systems adjacent to the project area shall be cleaned and flushed with a vacuor truck and/or sewer jetter, and original drainage restored. Sediment, rock, and other debris shall be collected and disposed of in a proper manner. In no case shall debris be flushed down a storm or sanitary sewer for disposal. All damaged/impaired storm facilities, irrigation, and house drainage pipes, drain tiles, sewer laterals, and culverts shall be repaired expeditiously.
3. All areas disturbed by the Contractor's operations inside dedicated rights-of-way or easements shall be restored to original condition. Areas outside of the easements or rights-of-way which are disturbed by the Contractor's operations shall be restored to their original or better condition in a method acceptable to the property owner. The Contractor shall obtain a written release from such property owners for any claims of injury or property damage prior to final acceptance of the work by the City.

#### B. Street Cleanup

The Contractor shall clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation. If any spilled material poses an erosion control threat, it shall be cleaned immediately. Cleaning shall be by grader and front-end loader, supplemented by power brushing, and hand labor, unless otherwise approved by the City. The Contractor shall follow the City's erosion control procedures.

As soon as practical after completion of all paving and gravel shoulder resurfacing, the Contractor shall remove all dirt, mud, rock, gravel, and other foreign material from the paved surface and storm drainage system.

#### C. Stream and Creek Crossings

The Contractor shall comply with all provisions of the permits required by the Washington State Departments of Fish and Wildlife, the U.S. Army Corps of Engineers, Washington State Department of Ecology, the Kelso Municipal Code, and all conditions placed on the applicant..

Prior to construction involving a present or future right-of-way is performed in any stream, the method of operation and the schedule of such work shall be approved in writing by the Director and the Community Development Director.

#### D. Protection of Property

The Contractor shall exercise all due care in protecting property along the route of the improvement. This protection shall include, but not be limited to, trees, yards, fences, drainage lines, mailboxes, driveways, shrubs, and lawns. If any of the above has been disturbed, they shall be restored to as near their original condition as possible or replaced to the owners approval.

#### E. Use of Explosives

All use of explosives is to follow Washington State Law.

Surrounding property owners affected by blasting are to be notified in writing a minimum of 48 hours in advance of the use of explosives.

Use of explosives should be done to limit the effects on surrounding neighbors.

Use of explosives must be approved by the City.

### 1.15 Railroad Crossings

#### A. General

Crossings of railroad rights-of-way shall be done in a manner, which conforms with the requirements of the railroad having jurisdiction. If any bonds and/or certificates of insurance protection are required, they shall be furnished by the Contractor or Owner to the railroad company with the City as an additionally-named insured.

#### B. Permits or Easements

Crossing agreements, permits, and/or easements for such crossings will be obtained by the applicant and all the terms of such permits or easements shall be met by the Owner and Contractor. A copy of the agreement, permit and/or easement shall be provided to the Director prior to construction drawing approval.

### 1.16 Penalties

Failure to comply with these Standards will be cause for withholding or withdrawing approval of plans or plats, forfeiture of bond, withholding Temporary and/or Final Certificate of Occupancy, and/or other penalties as provided by law.